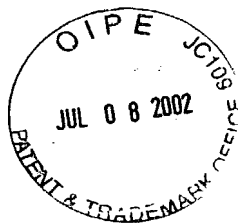




| U.S. APPLICATION NO. (IF KNOWN, SEE 37 CFR  |              | INTERNATIONAL APPLICATION NO. |  | ATTORNEY'S DOCKET NUMBER  |    |
|---|--------------|-------------------------------|--|---------------------------|----|
| 10/089869   |              | PCT/CH00/00572                |  | 753-10 PCT/US             |    |
| 24. The following fees are submitted:   |              |                               |  | CALCULATIONS PTO USE ONLY |    |
| BASIC NATIONAL FEE ( 37 CFR 1.492 (a) (1) - (5)) :  |              |                               |  |                           |    |
| <input type="checkbox"/> Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO and International Search Report not prepared by the EPO or JPO . . . . . \$1040.00          |              |                               |  |                           |    |
| <input checked="" type="checkbox"/> International preliminary examination fee (37 CFR 1.482) not paid to USPTO but International Search Report prepared by the EPO or JPO . . . . . \$890.00  |              |                               |  |                           |    |
| <input type="checkbox"/> International preliminary examination fee (37 CFR 1.482) not paid to USPTO but international search fee (37 CFR 1.445(a)(2)) paid to USPTO . . . . . \$740.00  |              |                               |  |                           |    |
| <input type="checkbox"/> International preliminary examination fee (37 CFR 1.482) paid to USPTO but all claims did not satisfy provisions of PCT Article 33(1)-(4) . . . . . \$710.00   |              |                               |  |                           |    |
| <input type="checkbox"/> International preliminary examination fee (37 CFR 1.482) paid to USPTO and all claims satisfied provisions of PCT Article 33(1)-(4) . . . . . \$100.00   |              |                               |  |                           |    |
| ENTER APPROPRIATE BASIC FEE AMOUNT =  |              |                               |  | \$890.00                  |    |
| Surcharge of \$130.00 for furnishing the oath or declaration later than months from the earliest claimed priority date (37 CFR 1.492 (e)). <input type="checkbox"/> 20 <input type="checkbox"/> 30  |              |                               |  | \$0.00                    |    |
| CLAIMS  | NUMBER FILED | NUMBER EXTRA                  | RATE   |                           |    |
| Total claims  | 2 - 20 =     | 0                             | x \$18.00  | \$0.00                    |    |
| Independent claims  | 1 - 3 =      | 0                             | x \$84.00  | \$0.00                    |    |
| Multiple Dependent Claims (check if applicable)   |              |                               | <input type="checkbox"/>   | \$0.00                    |    |
| TOTAL OF ABOVE CALCULATIONS =   |              |                               |  | \$890.00                  |    |
| <input checked="" type="checkbox"/> Applicant claims small entity status. See 37 CFR 1.27). The fees indicated above are reduced by 1/2.  |              |                               |  | \$445.00                  |    |
| SUBTOTAL =  |              |                               |  | \$445.00                  |    |
| Processing fee of \$130.00 for furnishing the English translation later than months from the earliest claimed priority date (37 CFR 1.492 (f)). <input type="checkbox"/> 20 <input type="checkbox"/> 30 +   |              |                               |  | \$0.00                    |    |
| TOTAL NATIONAL FEE =  |              |                               |  | \$445.00                  |    |
| Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31) (check if applicable).   |              |                               | <input checked="" type="checkbox"/>  | \$40.00                   |    |
| TOTAL FEES ENCLOSED =   |              |                               |  | \$485.00                  |    |
|   |              |                               |  | Amount to be refunded:    | \$ |
|   |              |                               |  | charged                   | \$ |
| a. <input checked="" type="checkbox"/> A check in the amount of \$485.00 to cover the above fees is enclosed.   |              |                               |  |                           |    |
| b. <input type="checkbox"/> Please charge my Deposit Account No _____ in the amount of _____ to cover the above fees<br>A duplicate copy of this sheet is enclosed.   |              |                               |  |                           |    |
| c. <input checked="" type="checkbox"/> The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. 08-2461 A duplicate copy of this sheet is enclosed.                |              |                               |  |                           |    |
| d. <input type="checkbox"/> Fees are to be charged to a credit card. WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038. |              |                               |  |                           |    |
| NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.   |              |                               |  |                           |    |
| SEND ALL CORRESPONDENCE TO:   |              |                               |  |                           |    |
| Daniel A. Scola, Jr., Esq.<br>HOFFMANN & BARON, LLP<br>6900 Jericho Turnpike<br>Syosset, NY 11791<br>(973) 331-1700   |              |                               | SIGNATURE<br><br>John S. Sopko<br>NAME<br>41,321<br>REGISTRATION NUMBER<br>April 4, 2002<br>DATE |                           |    |



10089869 10/089869

Rec'd PCT/PTO 08 JUL 2002

WO 01/34331

PCT/CH00/00572

1

### Sealing device

5 The invention relates to a sealing device for the external sealing of a collet chuck housing of a machine tool with an inserted collet chuck and with a preceding sealing washer, which is provided, in its cylindrical surface facing towards the tool shank, with an annular circumferential groove and with an elastic sealing body disposed in said groove.

10 It is known for this purpose to provide a tensioning nut with a sealing washer which outwardly locks the front side of the tensioning nut, i.e. the side facing away from the machine. In the cylindrical surface of the feedthrough facing towards the tool shank, such sealing washers conventionally possess an annular groove in which an O-ring is disposed. The dimensions of the O-ring are such that it sits elastically against the tool shank, closing the annular gap between said shank and  
15 the sealing washer. The seal is substantially provided by the elasticity of the O-ring.

20 At higher internal pressures of the coolant, the seal is not always assured, especially when the elasticity and the surface of the O-ring have been degraded by prolonged use.

The object of the invention is to provide a sealing device which has an improved resistance to higher internal pressures.

25 This object is achieved according to the invention by making the width and depth of the groove provided in the surface of the sealing washer facing towards the tool shank larger than the diameter of the elastic sealing body so that the latter can move axially in the groove. The sealing body is preferably an O-ring.

30 A preferred embodiment of the invention is described below with the aid of the accompanying drawing.

Fig. 1 is a sectional view of a clamping device with a tensioning nut and sealing washer;

Fig. 2 shows enlarged details of the feedthrough of the sealing washer; and

Fig. 3 shows the same details together with the compression.

5

The clamping device for a tool shank 1 shown in Fig. 1 consists of a collet chuck housing 2, an inserted collet chuck 3 and a tensioning nut 4. Located on the face of the tensioning nut 4 is a sealing washer 5 inserted from the back, i.e. from the machine side. The sealing washer 5 has a feedthrough for the tool shank and, in the cylindrical surface 6 facing towards the tool shank 1, is provided with an annular circumferential groove 7 in which an O-ring 8 is disposed. The arrows 9 indicate the direction of flow of the coolant in the slots of the collet chuck 3 and in the bore of the tool shank 1.

15 In contrast to the conventional grooves for O-rings, the groove 7 in the present case is wider and deeper than the diameter of the O-ring 8 so that the latter is axially displaceable in the groove. This can be seen in Fig. 2, where in Fig. 2a the O-ring 8 is located axially in the middle of the groove 7, in which position it would have no sealing function per se.

20

In Fig. 2b the O-ring is axially displaced and sits against a side wall of the groove. In this position the feedthrough is sealed, especially when the O-ring 8 is compressed by the coolant pressure against the side wall of the groove and also simultaneously against the tool shank 1. This is shown in Fig. 3, where the arrows 10 indicate the internal pressure. Fig. 3a shows a situation in which a tool shank of smaller diameter is inserted. In Fig. 3b a tool shank of larger diameter is inserted, the gap between the shank and the feedthrough of the sealing washer being narrower. This adaptation to tool shanks of different thicknesses is better assured with the solution according to the invention than with the conventional solution.

25

30 According to an as yet unpublished proposal, the collet chuck rather than the tensioning nut can be provided with a sealing washer. The solution according to the invention is equally suitable for this type of sealing washer.

1. Sealing device for the external sealing of a collet chuck housing of a machine tool with an inserted collet chuck and with a preceding sealing washer, which is provided, in its cylindrical surface facing towards the tool shank, with an annular circumferential groove and with an elastic sealing body disposed in said groove, characterized in that the width and depth of the groove (7) provided in the surface (6) of the sealing washer (5) facing towards the tool shank (1) are larger than the diameter of the elastic sealing body (8) so that the latter can move axially in the groove.
2. Sealing device according to Claim 1, characterized in that the sealing body (8) is an O-ring.

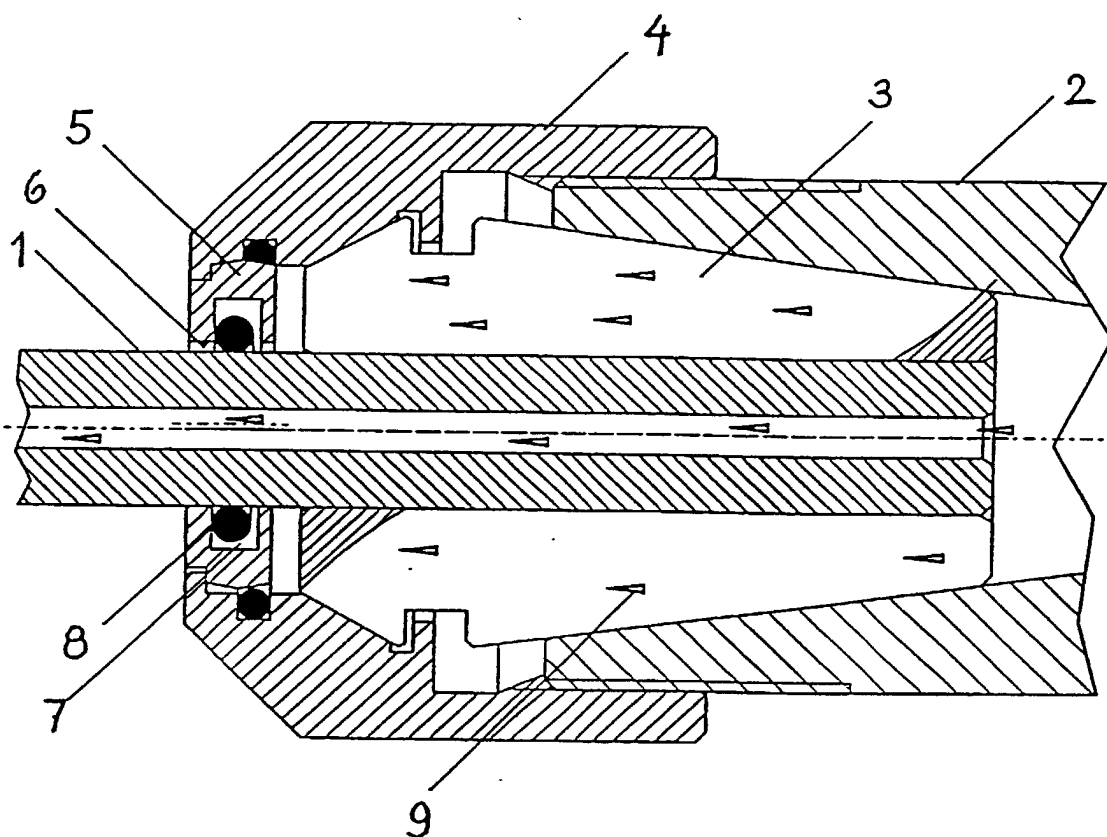


Fig. 1

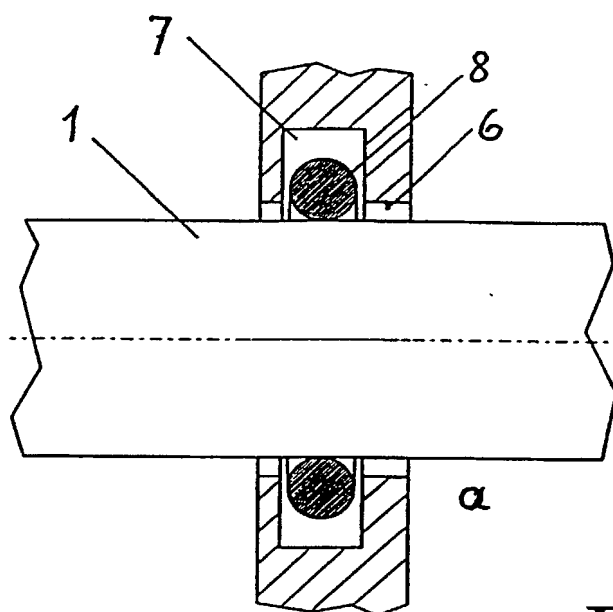
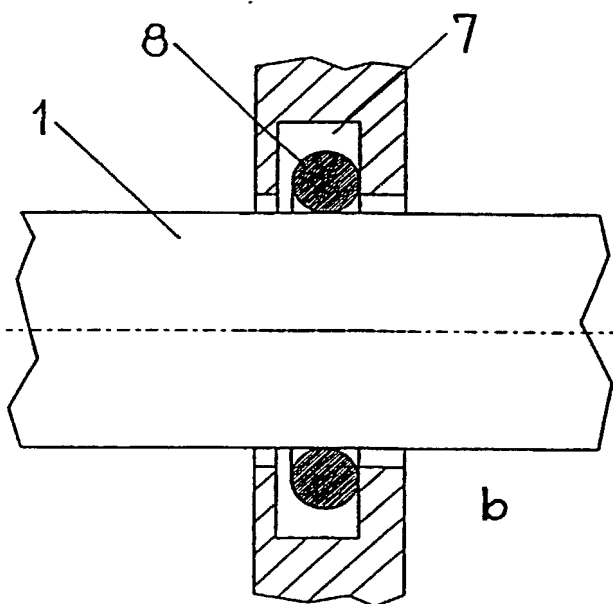


Fig. 2



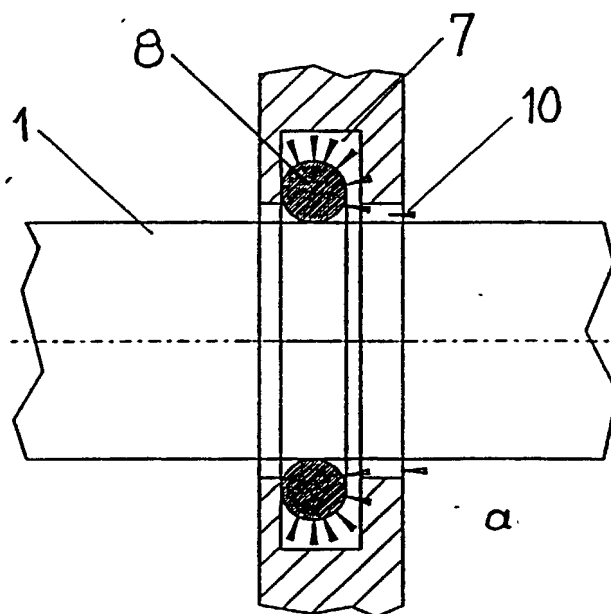
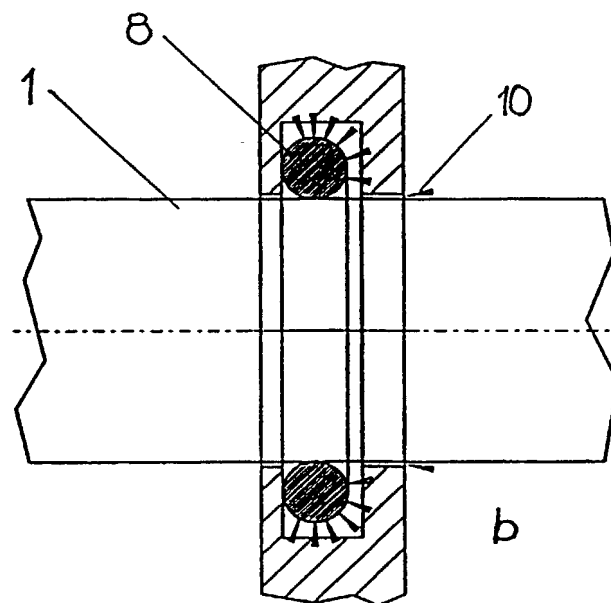


Fig. 3





## PATENT

**[0001]** This application is the national stage filing of PCT No. PCT/CH00/00572 filed on October 26, 2000 claiming priority to Application No. CH 2051/99 filed on November 9, 1999.

## **FIELD OF THE INVENTION**

**[0002]** The present invention relates to a sealing device for the external sealing of a collet chuck housing of a machining tool having a collet chuck preceded by a sealing washer. More particularly, the present invention relates to a novel sealing device for external sealing of a collet chuck housing wherein the sealing device includes an annular circumferential groove with an elastic sealing body disposed therein.

## BACKGROUND OF THE INVENTION

**[0003]** It is known to provide a tensioning nut with a sealing washer which outwardly locks the front side of the tensioning nut (i.e. the side facing away from the machine) for the purpose of providing a liquid tight seal. Conventional cylindrical surfaces of the opening facing towards the tool shank, include sealing washers having an annular groove in which an O-ring is disposed. The dimensions of the O-ring are such that it sits elastically against the tool shank thus closing the annular gap between the shank and the sealing washer. The seal is substantially provided by the elasticity of the O-ring.

**[0004]** When coolant internal pressures become elevated, the seal is not always assured. This is especially true when the elasticity and the surface of the O-ring have been degraded by prolonged use.



compressed.

## DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

**[0009]** With the foregoing and additional features in mind, this invention will now be described in more detail, and other benefits and advantages thereof will be apparent from the following detailed description when taken in conjunction with the accompanying drawings in which identical numbers identify like elements throughout the several views.

**[0010]** The clamping device for a tool shank 1 shown in FIG. 1 consists of a collet chuck housing 2, an inserted collet chuck 3, and a tensioning nut 4. A sealing washer 5 is located on the face of the tensioning nut 4, which has been inserted from the back (i.e. from the machine side). The sealing washer 5 has an opening for the tool shank 1, a cylindrical surface 6 facing towards the tool shank 1, and an annular circumferential groove 7. A seal or sealing body, in this case an O-ring 8, is disposed within the groove 7. The arrows indicate the direction of flow of the coolant in the slots of the collet chuck 3 and in the bore of the tool shank 1.

**[0011]** In contrast to the conventional grooves for O-rings, the groove 7 in the present invention is both wider and deeper than a cross section of the O-ring 8 so that the latter is axially displaceable in the groove 7. This can be seen in FIG. 2a, where the O-ring 8 is located axially in the middle of the groove 7, in which position it would have no sealing function *per se*.

**[0012]** Referring now to FIG. 2b, the O-ring 8 is axially displaced and sits against a side wall of the groove 7. In this position, the opening is sealed, especially when the O-ring 8 is

compressed, for example, by the coolant pressure against the side wall of the groove 7 and also simultaneously against the tool shank 1. Compression of the O-ring 8 by the coolant pressure is shown in FIG. 3a and FIG. 3b, where arrows 10 indicate the direction of internal pressure. FIG. 3a shows a situation in which a tool shank 1 of smaller diameter is inserted. In FIG. 3b, a tool shank 1 of larger diameter is inserted, with the gap between the shank and the opening of the sealing washer 5 being narrower. The ability of the seal to adapt to tool shanks having different thicknesses is better assured with the design of the present invention as opposed to the conventional design.

[0013] In the design according to the present invention, it is also possible for the collet chuck rather than the tensioning nut to be provided with a sealing washer. The design according to the present invention is equally suitable for this type of sealing washer.

[0014] Although the illustrative embodiments of the present invention have been described herein with reference to the accompanying drawings, it is to be understood that the invention is not limited to those precise embodiments, and that various other changes and modifications may be effected therein by one skilled in the art without departing from the scope or spirit of the invention, and it is intended to claim all such changes and modifications to fall within the scope of the invention.



**SEALING DEVICE****ABSTRACT OF THE INVENTION**

[0015] The invention relates to a sealing device which is provided with an annular circumferential groove in a preceding sealing washer and having a sealing body disposed in the groove. The width and depth of the groove are larger than the cross-section of the sealing body so that the sealing body can be axially moved in the groove and may be forced against the wall of the groove and the tool shank by inner pressure provided, for example, by a coolant.

SEALING DEVICE

Inventors: Ernst Gerber

Docket No: 753-13 PCT/US

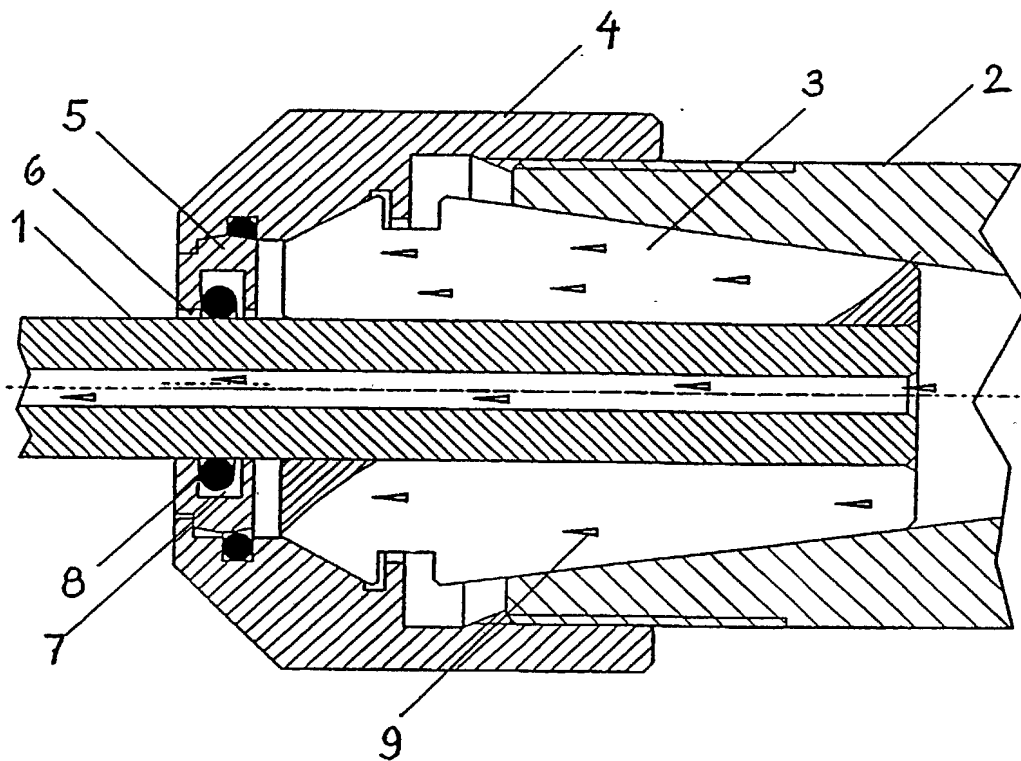


Fig. 1

SEALING DEVICE

Inventors: Ernst Gerber

Docket No: 753-13 PCT/US

Fig. 2a

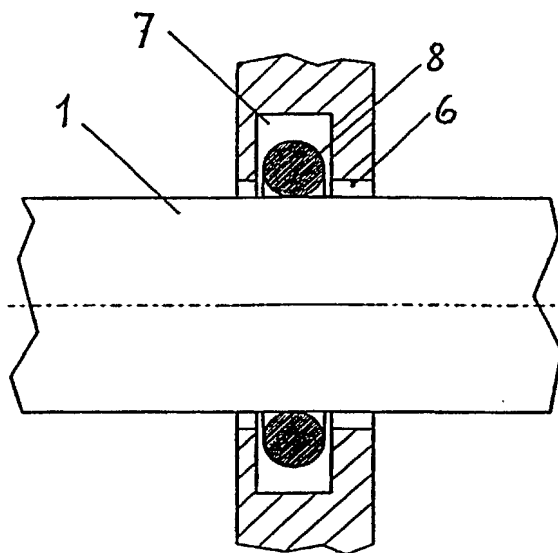


Fig. 2b

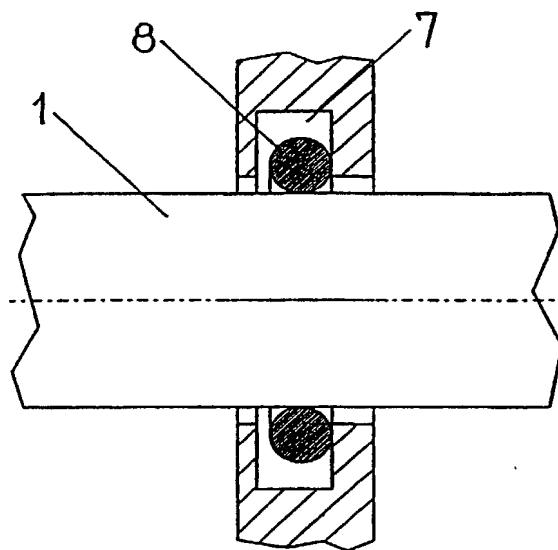




Fig. 3a

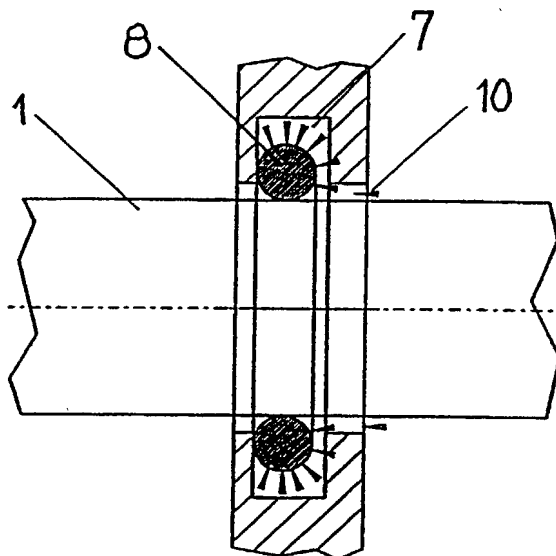
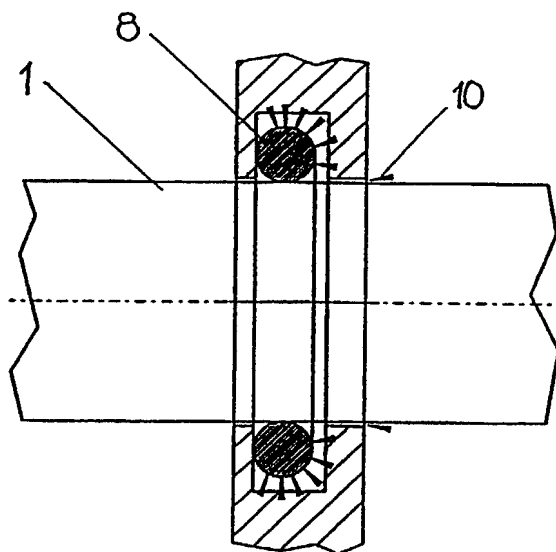


Fig. 3b



Attorney's Docket No. .

PATENT

## COMBINED DECLARATION AND POWER OF ATTORNEY

(ORIGINAL, DESIGN, NATIONAL STAGE OF PCT, SUPPLEMENTAL,  
DIVISIONAL, CONTINUATION OR CIP)

As a below named inventor, I hereby declare that:

## TYPE OF DECLARATION

This declaration is of the following type: (check one)

- |                                       |  |
|---------------------------------------|--|
| <input type="checkbox"/> Original     | <input checked="" type="checkbox"/> National Stage PCT |
| <input type="checkbox"/> Supplemental | <input type="checkbox"/> Divisional                    |
| <input type="checkbox"/> Design       | <input type="checkbox"/> Continuation                  |
|                                       | <input type="checkbox"/> Continuation-in-Part (CIP)    |

## INVENTORSHIP IDENTIFICATION

NOTE: If the inventors are each not the inventors of all the claims an explanation of the facts, including the ownership of all the claims at the time the last claimed invention was made, should be submitted.

My residence, post office address and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

## SEALING DEVICE

the specification of which: (complete (a), (b) or (c))

- (a) ☐ is attached hereto.
- (b) ☐ was filed on \_\_\_\_\_ as  
☐ Serial No. \_\_\_\_\_ or  
☐ Express Mail No. \_\_\_\_\_, as Serial No. not yet known  
and was amended on \_\_\_\_\_. (If applicable)
- (c) ☒ was described and claimed in PCT International Application No. PCT/CH00/00572  
filed on 26.10.00 and as amended under PCT Article 19 on 11.01.02 (If any)

## ACKNOWLEDGMENT OF REVIEW OF PAPERS AND DUTY OF CANDOR

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above, and that the filing of said specification, if heretofore filed, was authorized by me.

I acknowledge the duty to disclose information which is material to the patentability of this application in accordance with Title 37, Code of Federal Regulations, §1.56(a).

**CLAIM OF PRIORITY OF EARLIER FOREIGN APPLICATION(S) UNDER 35 U.S.C. §119(a)-(d)**

I hereby claim foreign priority benefits under Title 35, United States Code, §119 of any foreign application(s) for patent or inventor's certificate or of any PCT international application(s) designating at least one country other than the United States of America listed below and have also identified below any foreign application(s) for patent or inventor's certificate or any PCT international application(s) designating at least one country other than the United States of America filed by me on the same subject matter having a filing date before that of the application(s) of which priority is claimed:

(List prior foreign/PCT application(s) filed within 12 months (6 months for design) prior to this U.S. application.)

NOTE: Where item (c) is entered above and the International Application which designated the U.S. claimed priority check item (e), enter the details below and make the priority claim.

| COUNTRY<br>(orPCT) | APPLICATION NO. | DATE OF FILING<br>(Day/Month/Year) | PRIORITY CLAIMED<br>UNDER 35 USC §119   |                             |
|--------------------|-----------------|------------------------------------|---|-----------------------------|
| CH                 | 2051/99         | 09.11.99                           | <input checked="" type="checkbox"/> YES | <input type="checkbox"/> NO |
|                    |                 |                                    | <input type="checkbox"/> YES            | <input type="checkbox"/> NO |

**CLAIM FOR BENEFIT OF PRIOR U.S. PROVISIONAL APPLICATION(S) UNDER 35 U.S.C. §119(e)**

I hereby claim the benefit under Title 35, United States Code, §119(e) of any United States provisional application(s) listed below:

(List prior U.S. provisional applications.)

| PROVISIONAL APPLICATION NO. | FILING DATE<br>(Day/Month/Year) |
|-----------------------------|---------------------------------|
|                             |                                 |
|                             |                                 |
|                             |                                 |

**CLAIM FOR BENEFIT OF EARLIER U.S./PCT APPLICATION(S) UNDER 35 U.S.C. 120**

I hereby claim the benefit under Title 35, United States Code, §120 of any United States application(s) or PCT international application(s) designating the United States of America that is/are listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in such prior application(s) in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, §1.56(a) which occurred between the filing date of the prior application(s) and the national or PCT international filing date of this application:



PLEASE SEND CORRESPONDENCE TO:

Daniel A. Scola, Jr.  
HOFFMANN & BARON, LLP  
6900 Jericho Turnpike  
Syosset, New York 11791

PLEASE DIRECT TELEPHONE CALLS TO:

Keith R. Lange  
(973) 331-1700

## DECLARATION

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further, that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

## SIGNATURE(S)

Full Name of Sole or First Inventor:

Ernst GERBER

Country of Citizenship:

Switzerland

Residence Address:

CH-4418 Reigoldswil / Switzerland CH X

Post Office Address:

Untere Chläberen 4

Date:

14.03.2002

Inventor's signature

Ernst Gerber

NOTE: All above spaces identifying inventors must be completed or deleted before any inventor executes this application